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(56) Documents cited

GB A 2137790
GB A 2065348

GB 1270682

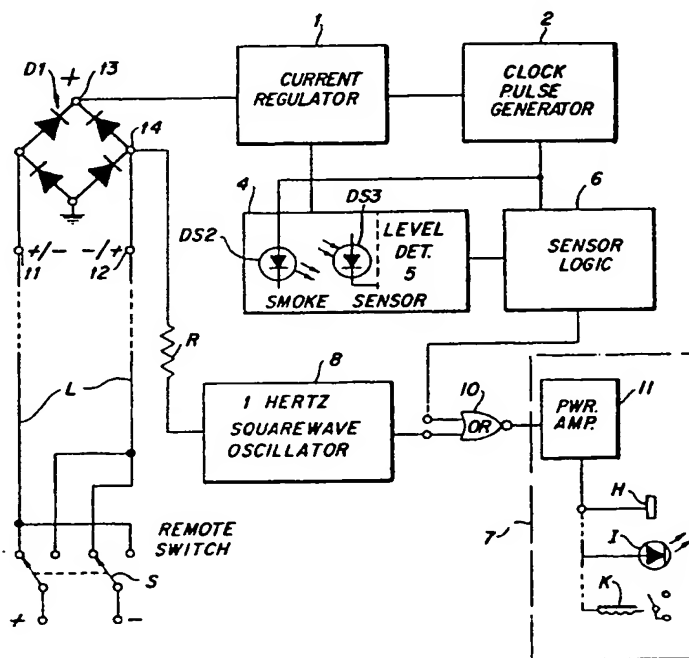
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(58) Field of search

G4N

(54) Apparatus for providing an environmental alarm indication

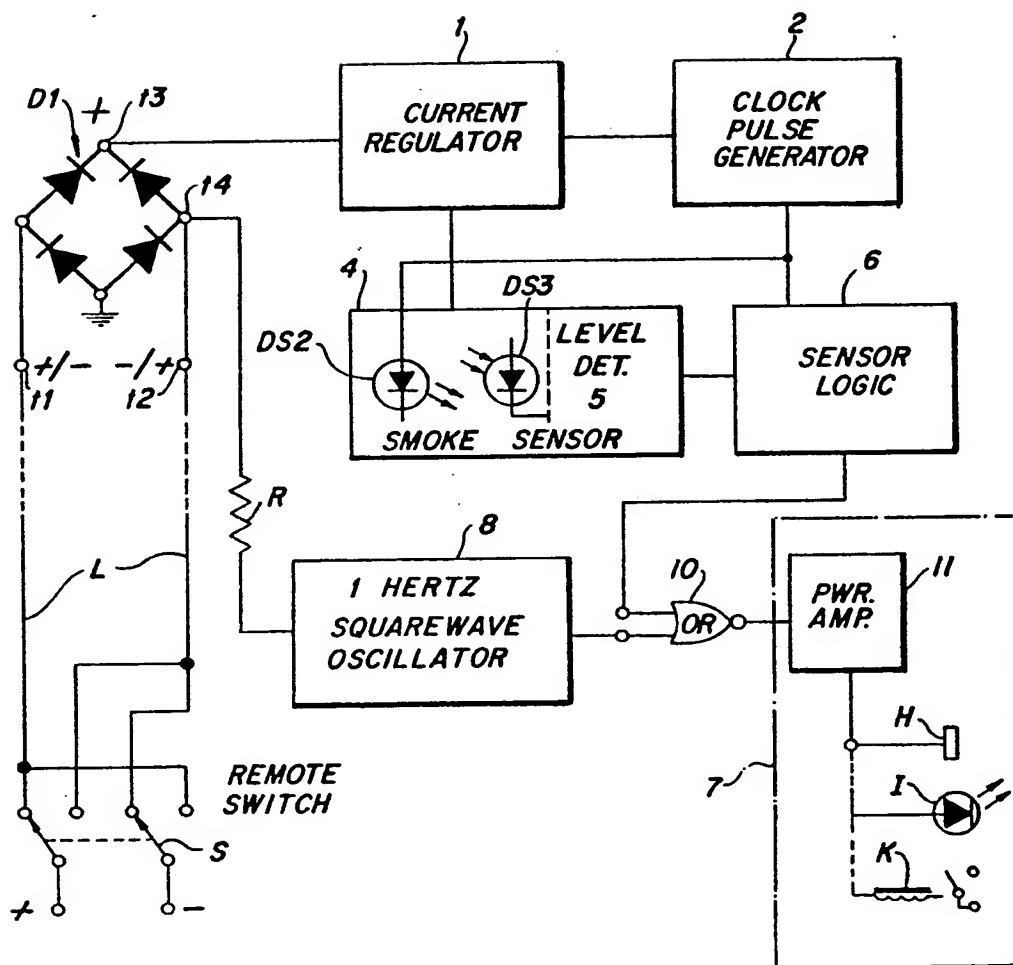
(57) An alarm (or like) system comprises a D.C. power supply of selectively reversible polarity; a first alarm operable when either polarity is supplied and effective to generate a first alarm signal upon detection of an event; and a second alarm effective to generate a further alarm signal (distinguishable from the first alarm signal) when supplied with one of the said polarities, but to remain silent when supplied with the other polarity. The described arrangement provides precedence for the first alarm whereby it overrides the second alarm if an event occurs while the second alarm is operating.



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SPECIFICATION

Apparatus for providing an environment alarm indication

5 The present invention relates to apparatus for indicating an environmental alarm condition such as the presence of smoke or gas.

Smoke detectors, gas detectors and like
10 apparatus for signalling an environmental alarm condition are commonly connected to a remote central power supply, usually a low voltage direct current source. Only a two-wire line is needed to supply the DC power to a
15 detector unit for detection although additional wires may be used for other purposes.

In its broadest aspect the invention provides apparatus for providing an indication of an environmental alarm condition; said apparatus
20 comprising a pair of terminals for receiving d.c. electrical power; means for sensing the polarity of the d.c. power applied to the terminals; a sensor energised by said d.c. power for sensing an environmental alarm
25 condition and for providing a signal in response to such conditions and means for providing a further signal in response to the polarity sensing means.

Further according to the invention apparatus
30 for signalling or indicating an environmental alarm condition comprises two input terminals receiving direct current electrical power from a remote source supplying current in a normal and an alternative polarity; an environmental
35 sensor producing an alarm signal in response to an alarm condition; an alarm responsive to the alarm signal to indicate the alarm condition in a first mode of indication; means for sensing the polarity of current at
40 the power input terminals including a generator of a secondary signal distinguished from the alarm signal when current at the input terminals is in the alternative polarity; and
45 means coupling the sensing means and secondary signal to the alarm to cause the alarm to operate in a second mode of indication.

The sensor may sense smoke particles gas or some other condition. The polarity sensing
50 means may be a diode bridge which initiates an oscillator on polarity reversal to provide the secondary signal.

The invention may be understood more readily and various other features of the invention may become apparent from consideration
55 of the following description.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawing, which is a schematic representation of apparatus
60 constructed in accordance with the invention.

As shown in the drawing, apparatus constructed in accordance with the invention utilises a smoke detector with a sensor 4 supplied
65 with low voltage DC power from a

remote ganged switch S. The power is conveyed along a two-wire line L to two input terminals t1 and t2 which normally are polarised with t1 positive and t2 negative with the
70 switch S in the position shown. Across the power input terminals t1, t2 is a conventional diode bridge D1 which provides no rectifying function but serves to hold the polarity position at the (+) terminal t3 of the bridge
75 irrespective of the position of the remote switch S and the consequent polarity of the two-wire line L. Across the bridge are two arms between the polarised plus terminal (+) and ground, each arm having two diodes with
80 an intermediate terminal.

Current from the (+) terminal t3 is supplied through a conventional current regulator to a clock pulse generator 2, the smoke
85 sensor 4 and associated logic 6. The detector circuitry 2, 4, 6, can be as described in United States patent No. 4 149 162. The smoke sensor 4 includes a light emitting diode DS2 which emits light pulses at the clock
90 pulse generator rate. A photoresponsive diode DS3 senses light from the emitter DS2 indirectly by scattering from smoke particles. When a significant density of smoke is present the output voltage of the photodiode
95 DS3 rises above the threshold of a level detector 5 which produces a pulsed alarm signal. If the alarm signal persists for three consecutive pulses, for example, existence of a true alarm condition is verified by the logic
100 6 and a steady alarm signal is relayed by the logic 6 through an OR gate 10, such as Motorola Co. type 14071, to the power amplifier 11 of an alarm 7. The amplifier 11 then operates in an alarm mode by applying a
105 continuous driving current to an alarm indicator such as a horn H, a light I or a relay K.

With the remote switch S in the position shown and the left power input terminal t1 positive, current will flow only in the left arm of the bridge connected to the normally positive
110 terminal t1, while the opposite arm of the bridge through terminal t4 will be substantially at ground potential. However, when the remote switch S is transferred from the position shown and reverses the power input
115 terminals to the alternative polarity with t1 negative and t2 positive, current will flow through the bridge arm including the terminal t4 and a positive voltage will appear at the terminal t4, the bridge and terminal thus
120 acting as polarity sensing means.

The positive voltage sensed by terminal t4 is coupled by a 15 kilohm resistor R4 to a 1 Hertz square wave oscillator 8 which applies a
125 secondary signal of pulses at a 1 Hertz repetition rate to the alternate input of the OR gate 10. If the smoke detector 4, 6 is not in the alarm state the power amplifier 11 of the alarm 7 and the indicators H, I or L will
130 operate in a second, interrupted mode easily distinguished from the continuous, alarm

mode.

But, if the smoke sensor 4, 6 is in the alarm state applying a continuous alarm mode signal to the OR gate, the alarm signal will override the secondary signal input to the OR gate and the OR gate will respond only to the alarm signal and transmit only a continuous alarm mode of signal to the alarm.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

15 CLAIMS

1. Apparatus for indicating an environmental alarm condition comprising:
two input terminals for receiving direct current electrical power from a remote source
supplying current in a normal and an alternative polarity;

an environmental sensor producing an alarm signal in response to an alarm condition;

an alarm responsive to the alarm signal to indicate the alarm condition in a first mode of indication;

means for sensing the polarity of current at the power input terminals including a generator of a secondary signal distinguished from the alarm signal when current at the input terminals is in the alternative polarity; and
means coupling the sensing means and secondary signal to the alarm to cause the alarm to operate in a second mode of indication.

2. Apparatus according to claim 1, wherein the polarity sensing means comprises a diode bridge connected across the power input terminals.

3. Apparatus according to claim 1 or 2 and further comprising a resistance connection between the polarity sensing means and the secondary signal generator.

4. Apparatus according to claim 1, 2 or 3, wherein the secondary signal generator at least includes an oscillator.

5. Apparatus according to claim 4, including a dividing circuit between the second signal generator and the alarm.

6. Apparatus according to any one of claims 1 to 5, wherein the sensor is adapted to sense smoke.

7. Apparatus according to any one of claims 1 to 6, wherein the coupling means comprises an OR gate connected to the alarm, the gate having inputs respectively connected to the environmental sensor and polarity sensing means for alternative coupling of the alarm signal and secondary signal to the alarm.

8. Apparatus according to claim 7, wherein the OR gate is effectively responsive only to the alarm signal of the sensor when both the alarm and secondary signals are

applied to the gate so as to cause the alarm to operate only in the first mode.

9. Apparatus according to claim 1, wherein the polarity sensing means comprises a bridge with two arms each having two diodes connected across the bridge through intermediate power input terminals to a polarised terminal connected to the environmental sensor, the coupling means being connected to one of the intermediate terminals.

10. Apparatus for providing an indication of an environmental alarm condition; said apparatus comprising a pair of terminals for receiving d.c. electrical power; means for sensing the polarity of the d.c. power applied to the terminals; a sensor energised by said d.c. power for sensing an environmental alarm condition and for providing a signal in response to such condition; and means for providing a further signal in response to the polarity sensing means.

11. Apparatus substantially as described with reference to, and illustrated in the accompanying drawing.

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